

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Withdrawn) A computer implemented method of information retrieval in a file system, comprising the steps of:

displaying a portion of a hierarchical tree that is representative of a repository of memorized files, levels of said hierarchical tree comprising directories and subdirectories thereunder; and

displaying a special virtual directory in each of said directories and said subdirectories;

invoking a semantic operator by selection of said special virtual directory;

displaying elements of at least a subtree of said hierarchical tree, said elements being selected by said semantic operator.

2. (Withdrawn) The method according to claim 1, wherein said step of displaying further comprises arranging a screen display in accordance with a specification of said semantic operator.

3. (Withdrawn) The method according to claim 1,  
wherein said elements comprise a portion of said directories.

4. (Withdrawn) The method according to claim 1,  
wherein said semantic operator is \_desc.

5. (Withdrawn) The method according to claim 1,  
wherein said semantic operator is \_star.

6. (Withdrawn) The method according to claim 1,  
wherein said repository of memorized files comprises documents  
written in a markup language.

7. (Withdrawn) A computer software product,  
comprising a computer-readable medium in which computer  
program instructions are stored, which instructions, when read  
by a computer, cause the computer to perform the steps of:

displaying a portion of a hierarchical tree that is  
representative of a repository of memorized files, levels of  
said hierarchical tree comprising directories and  
subdirectories thereunder; and

displaying a special virtual directory in each of  
said directories and said subdirectories;

invoking a semantic operator by selection of said special virtual directory;

displaying elements of at least a subtree of said hierarchical tree, said elements being selected by said semantic operator.

8. (Withdrawn) The computer software product according to claim 7, wherein said step of displaying further comprises arranging a screen display in accordance with a specification of said semantic operator.

9. (Withdrawn) The computer software product according to claim 7, wherein said elements comprise a portion of said directories.

10. (Withdrawn) The computer software product according to claim 7, wherein said semantic operator is \_desc.

11. (Withdrawn) The computer software product according to claim 7, wherein said semantic operator is \_star.

12. (Withdrawn) The computer software product according to claim 7, wherein said repository of memorized files comprises documents written in a markup language.

13. (Withdrawn) A computer implemented information retrieval system for presenting a semantically dependent directory structure of files to a user, comprising:

a file system engine, that receives a file request via a file system application programming interface and issues file system calls to an operating system, wherein said file request specifies a file content of memorized files,

wherein responsive to said file request, said file system engine returns a hierarchical tree of directories to said file system application programming interface, said directories having references to selected ones of said memorized files;

wherein said file system engine displays a special virtual directory in each of said directories, wherein a said special virtual directory comprises at least a portion of said hierarchical tree, said portion being selected by a semantic operator.

14. (Withdrawn) The information retrieval system according to claim 13, further comprising a monitor, having a screen display arranged thereon in accordance with a specification of said semantic operator.

15. (Withdrawn) The information retrieval system according to claim 13, wherein said semantic operator is \_desc.

16. (Withdrawn) The information retrieval system according to claim 13, wherein said semantic operator is \_star.

17. (Withdrawn) The information retrieval system according to claim 13, wherein said memorized files comprise documents written in a markup language.

18. (Withdrawn) The information retrieval system according to claim 17, wherein said markup language is XML.

19. (Withdrawn) A computer implemented method of information retrieval, comprising the steps of:

retrieving structural information of memorized documents according to a document type declaration that corresponds to each of said documents;

retrieving elements, attributes and values of said elements and said attributes of said documents;

generating a multilevel inverted index from said structural information, said elements, said attributes and said values;

accepting a specification from a user having members that comprise at least one of said elements, said attributes and said values;

responsive to said specification, extracting data from said multilevel inverted index that complies with at least one of said members;

displaying a hierarchical tree, levels of said hierarchical tree comprising directories, wherein said directories each comprise a sequence of said members, and wherein contents of said directories and contents of subdirectories thereunder comprise selected ones of said documents possessing said specification; and

displaying a special virtual directory in each of said directories, wherein a content of said special virtual directory comprises at least one level of said hierarchical tree, said one level being more deeply nested than a level of said special virtual directory in said hierarchical tree.

20. (Withdrawn) The method according to claim 19, wherein said step of displaying said special virtual directory comprises invoking an operator \_desc to a context node of said special virtual directory.

21. (Withdrawn) The method according to claim 20, wherein said step of invoking said operator \_desc further comprises the steps of:

selecting all descendants of said context node; and displaying a list of said descendants.

22. (Withdrawn) The method according to claim 21, wherein said list is a linear list.

23. (Withdrawn) The method according to claim 19, wherein said step of displaying said special virtual directory comprises invoking an operator \_\_star to a context node of said special virtual directory.

24. (Withdrawn) The method according to claim 23, wherein said step of invoking said operator \_star further comprises the steps of:

selecting all children of said context node; and displaying a list of grandchildren of said context node.

25. (Withdrawn) The method according to claim 24, wherein said list is a linear list.

26. (Withdrawn) The method according to claim 24, wherein said children are selected from said elements.

27. (Withdrawn) The method according to claim 24, wherein said children comprise selected ones of said elements, said attributes, and said values.

28. (Withdrawn) The method according to claim 19, wherein said multilevel inverted index comprises a structural section having postings of said structural information, and a words section having postings of said values, wherein said values are words.

29. (Withdrawn) The method according to claim 19, wherein said documents are XML documents.

30. (Withdrawn) The method according to claim 19, further comprising the steps of:

noting changes in a composition of a repository of said documents; and



updating said multilevel inverted index responsive to said changes.

31. (Withdrawn) A computer implemented method of information retrieval, comprising the steps of:

retrieving structural information of memorized documents according to a document type declaration that corresponds to each of said documents, wherein said documents are written in a markup language;

retrieving elements, attributes and values of said elements and said attributes of said documents;

generating a multilevel inverted index from said structural information, said elements, said attributes and said values;

accepting a specification from a user having members that comprise at least one of said elements, said attributes and said values;

responsive to said specification, extracting data from said multilevel inverted index that complies with at least one of said members;

displaying a hierarchical tree, levels of said hierarchical tree comprising directories, wherein said directories each comprise a sequence of said members, and wherein contents of said directories and contents of

subdirectories thereunder comprise selected ones of said documents possessing said specification; and

displaying a special virtual directory in each of said directories, wherein a content of said special virtual directory comprises at least one level of said hierarchical tree, said one level being more deeply nested than a level of said special virtual directory in said hierarchical tree.

32. (Withdrawn) The method according to claim 31, wherein said step of displaying said special virtual directory comprises invoking an operator \_desc to a context node of said special virtual directory.

33. (Withdrawn) The method according to claim 32, wherein said step of invoking said operator \_desc further comprises the steps of:

selecting all descendants of said context node; and displaying a list of said descendants.

34. (Withdrawn) The method according to claim 33, wherein said list is a linear list.

35. (Withdrawn) The method according to claim 31, wherein said step of displaying said special virtual directory comprises invoking an operator \_star to a context node of said special virtual directory.

36. (Withdrawn) The method according to claim 35, wherein said step of invoking said operator \_star further comprises the steps of:

selecting all children of said context node; and displaying a list of grandchildren of said context node.

37. (Withdrawn) The method according to claim 36, wherein said list is a linear list.

38. (Withdrawn) The method according to claim 36, wherein said children are selected from said elements.

39. (Withdrawn) The method according to claim 36, wherein said children comprise selected ones of said elements, said attributes, and said values.

40. (Withdrawn) The method according to claim 31, wherein said multilevel inverted index comprises a structural section having postings of said structural information, and a words section having postings of said values, wherein said values are words.

41. (Withdrawn) The method according to claim 31, wherein said documents are XML documents.

42. (Withdrawn) The method according to claim 31, further comprising the steps of:  
noting changes in a composition of a repository of said documents; and  
updating said multilevel inverted index responsive to said changes.

43. (Withdrawn) A computer software product, comprising a computer-readable medium in which computer program instructions are stored, which instructions, when read by a computer, cause the computer to perform the steps of:  
retrieving structural information of memorized documents according to a document type declaration that corresponds to each of said documents;

retrieving elements, attributes and values of said elements and said attributes of said documents;

generating a multilevel inverted index from said structural information, said elements, said attributes and said values;

accepting a specification from a user having members that comprise at least one of said elements, said attributes and said values;

responsive to said specification, extracting data from said multilevel inverted index that complies with at least one of said members;

displaying a hierarchical tree, levels of said hierarchical tree comprising directories, wherein said directories each comprise a sequence of said members, and wherein contents of said directories and contents of subdirectories thereunder comprise selected ones of said documents possessing said specification; and

displaying a special virtual directory in each of said directories, wherein a content of said special virtual directory comprises at least one level of said hierarchical tree, said one level being more deeply nested than a level of said special virtual directory in said hierarchical tree.

44. (Withdrawn) The computer software product according to claim 43, wherein said step of displaying said special virtual directory comprises invoking an operator \_desc to a context node of said special virtual directory.

45. (Withdrawn) The computer software product according to claim 44, wherein said step of invoking said operator \_desc further comprises the steps of:

selecting all descendants of said context node; and displaying a list of said descendants.

46. (Withdrawn) The computer software product according to claim 45, wherein said list is a linear list.

47. (Withdrawn) The computer software product according to claim 43, wherein said step of invoking said operator \_star comprises invoking an operator \_star to a context node of said special virtual directory.

48. (Withdrawn) The computer software product according to claim 47, wherein said step of invoking said operator \_star further comprises the steps of:

selecting all children of said context node; and displaying a list of grandchildren of said context node.

49. (Withdrawn) The computer software product according to claim 48, wherein said list is a linear list.

50. (Withdrawn) The computer software product according to claim 48, wherein said children are selected from said elements.

51. (Withdrawn) The computer software product according to claim 48, wherein said children comprise selected ones of said elements, said attributes, and said values.

52. (Withdrawn) The computer software product according to claim 43, wherein said multilevel inverted index comprises a structural section having postings of said structural information, and a words section having postings of said values, wherein said values are words.

53. (Withdrawn) The computer software product according to claim 43, wherein said documents are XML documents.

54. (Withdrawn) The computer software product according to claim 43, wherein said instructions further cause the computer to perform the steps of:

noting changes in a composition of a repository of said documents; and

updating said multilevel inverted index responsive to said changes.

55. (Withdrawn) A computer software product, comprising a computer-readable medium in which computer program instructions are stored, which instructions, when read by a computer, cause the computer to perform the steps of:

retrieving structural information of memorized documents according to a document type declaration that corresponds to each of said documents, wherein said documents are written in a markup language;

retrieving elements, attributes and values of said elements and said attributes of said documents;

generating a multilevel inverted index from said structural information, said elements, said attributes and said values;

accepting a specification from a user having members that comprise at least one of said elements, said attributes and said values;



responsive to said specification, extracting data from said multilevel inverted index that complies with at least one of said members;

displaying a hierarchical tree, levels of said hierarchical tree comprising virtual directories, wherein said virtual directories each comprise a sequence of said members, and wherein contents of said virtual directories and contents of virtual subdirectories thereunder comprise selected ones of said documents possessing said specification; and

displaying a special virtual directory in each of said virtual directories, wherein a content of said special virtual directory comprises at least one level of said hierarchical tree, said one level being more deeply nested than a level of said special virtual directory in said hierarchical tree.

56. (Withdrawn) The computer software product according to claim 55, wherein said step of displaying said special virtual directory comprises invoking an operator \_desc to a context node of said special virtual directory.

57. (Withdrawn) The computer software product according to claim 56, wherein said step of invoking said operator \_desc further comprises the steps of:

selecting all descendants of said context node; and  
displaying a list of said descendants.

58. (Withdrawn) The computer software product  
according to claim 57, wherein said list is a linear list.

59. (Withdrawn) The computer software product  
according to claim 55, wherein said step of displaying said  
special virtual directory comprises invoking an operator \_star  
to a context node of said special virtual directory.

60. (Withdrawn) The computer software product  
according to claim 59, wherein said step of invoking said  
operator \_star further comprises the steps of:

selecting all children of said context node; and  
displaying a list of grandchildren of said context node.

61. (Withdrawn) The computer software product  
according to claim 60, wherein said list is a linear list.

62. (Withdrawn) The computer software product  
according to claim 60, wherein said children are selected from  
said elements.

63. (Withdrawn) The computer software product according to claim 60, wherein said children comprise selected ones of said elements, said attributes, and said values.

64. (Withdrawn) The computer software product according to claim 55, wherein said multilevel inverted index comprises a structural section having postings of said structural information, and a words section having postings of said values, wherein said values are words.

65. (Withdrawn) The computer software product according to claim 55, wherein said documents are XML documents.

66. (Withdrawn) The computer software product according to claim 55, wherein said instructions further cause the computer to perform the steps of:

noting changes in a composition of a repository of said documents; and

updating said multilevel inverted index responsive to said changes.

67. (Currently amended) A computer implemented information retrieval system for ~~presenting~~ returning a

semantically dependent directory structure of files to a user, comprising:

a file system engine, that receives a file request via a file system application programming interface ~~and issues file system calls to an operating system~~, wherein said file request specifies a file content of memorized files, ~~wherein said files comprise documents written in a markup language;~~

a parser, linked to said file system engine, that retrieves structural information of said documents, said parser further retrieving at least one of elements, attributes and respective values thereof from said documents;

an indexer, linked to said parser, for constructing an inverted index of said elements and said attributes and said respective values thereof,

wherein responsive to said file request, said file system engine retrieves postings of said inverted index that satisfy requirements of said file request, and returns a hierarchical tree of directories to said ~~file system application programming interface~~ user, ~~said directories having references to selected ones of said documents corresponding to said postings; and~~

wherein said file system engine ~~displays~~ returns a special virtual directory in each of said directories, wherein a content of said special virtual directory comprises at least

one level of said hierarchical tree, said one level being more deeply nested than a level of said special virtual directory in said hierarchical tree.

68. (Currently amended) The information retrieval system according to claim 67, wherein said file system engine ~~displays~~ returns contents of said special virtual directory by invoking an operator—~~dese~~, said operator being designated responsively to a name of said special virtual directory, to a context node of a parent of said special virtual directory..

69. (Currently amended) The information retrieval system according to claim 68, wherein said file system engine ~~displays~~ returns contents of said special virtual directory by parsing said name of said special virtual directory, translating said name of said special virtual directory into a query and responding to said query using said inverted index ~~the steps of:~~

~~selecting all descendants of said context node, and displaying a list of said descendants.~~

70-75. (Canceled)

76. (Original) The information retrieval system of claim 67, wherein said inverted index comprises a structural section having postings of said structural information, and a words section having postings of words of said documents.

77. (Original) The information retrieval system of claim 67, further comprising an analyzer for updating said inverted index, wherein said analyzer analyzes additions to said memorized files.

78. (Currently amended) The information retrieval system of claim 67, wherein said parser retrieves said structural information from ~~document type declarations of~~ said documents.

79. (Currently amended) A computer implemented information retrieval system for ~~presenting~~ returning a semantically dependent directory structure of XML files to a user, comprising:

a file system engine, that receives a file request via a file system application programming interface ~~and issues file system calls to an operating system,~~ wherein said file request specifies a file content of memorized files, ~~wherein said files comprise documents written in a markup language;~~

an XML parser, linked to said file system engine, that retrieves structural information of XML documents, said XML parser further retrieving at least one of elements, attributes and respective values thereof from said XML documents;

an indexer, linked to said XML parser, for constructing an inverted index of said elements and said attributes and said respective values thereof,

wherein responsive to said file request, said file system engine retrieves postings of said inverted index that satisfy requirements of said file request, and returns a hierarchical tree of directories to said ~~file system application programming interface~~ user, ~~said directories having references to selected ones of said documents corresponding to said postings; and~~

wherein said file system engine ~~displays~~ returns a special virtual directory in each of said directories, wherein a content of said special virtual directory comprises at least one level of said hierarchical tree, said one level being more deeply nested than a level of said special virtual directory in said hierarchical tree.

80. (Currently amended) The information retrieval system according to claim 79, wherein said file system engine

~~displays~~ returns contents of said special virtual directory by invoking an operator—dese, said operator being designated responsively to a name of said special virtual directory, to a context node of a parent of said special virtual directory

81. (Currently amended) The information retrieval system according to claim 80, wherein said file system engine ~~displays~~ returns contents of said special virtual directory by parsing said name of said special virtual directory, translating said name of said special virtual directory into a query and responding to said query using said inverted index ~~the steps of:~~

~~selecting all descendants of said context node; and displaying a list of said descendants.~~

82-87. (Canceled).

88. (Original) The information retrieval system of claim 79, wherein said inverted index comprises a structural section having postings of said structural information, and a words section having postings of words of said XML documents.

89. (Original) The information retrieval system of claim 79, further comprising an XML analyzer for updating said



inverted index, wherein said XML analyzer analyzes additions to said memorized files.

90. (Currently amended) The information retrieval system of claim 79, wherein said XML parser retrieves said structural information from ~~document type declarations of~~ said XML documents.